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NUREG-0824
Supplement No. 1

Integrated Plant Safety Assessment
Systematic Evaluation Program

Millstone Nuclear Power Station, Unit 1

Northeast Nuclear Energy Company
Docket No. 50-245

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

November 1985

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ABSTRACT

The U.S. Nuclear Regulatory Commission (NRC) has prepared Supplement 1 to the final Integrated Plant Safety Assessment Report (IPSAR) (NUREG-0824), under the scope of the Systematic Evaluation Program (SEP), for Northeast Nuclear Energy Company's Millstone Nuclear Power Station, Unit 1 located in Waterford, Connecticut. The SEP was initiated by the NRC to review the design of older operating nuclear power plants to reconfirm and document their safety. This report documents the review completed under the SEP for those issues that required refined engineering evaluations or the continuation of ongoing evaluations subsequent to issuing the Final IPSAR for the Millstone 1 plant. The review has provided for (1) an assessment of the significance of differences between current technical positions on selected safety issues and those that existed when Millstone 1 was licensed, (2) a basis for deciding how these differences should be resolved in an integrated plant review, and (3) a documented evaluation of plant safety. The final IPSAR and its supplement will form part of the bases for considering the conversion of the existing provisional operating license to a full-term operating license.

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Acronyms and Initialisms

ABT	automatic bus transfer
ac	alternating current
APRM	average power range monitor
BTP	branch technical position
BTU	British thermal unit
BWR	boiling water reactor
CFM	cubic feet per minute
CFR	Code of Federal Regulations
CS	core spray
CST	condensate storage tank
dc	direct current
ECCS	emergency core cooling systems
EGTG	emergency gas turbine generator
F	Fahrenheit
ft	feet
FTOL	full-term operating license
FWCI	feedwater coolant injection
GDC	general design criterion
GE	General Electric
ICSB	Instrumentation and Control Branch
IE	Inspection and Enforcement
IEEE	Institute of Electrical and Electronics Engineers
IPSAR	Integrated Plant Safety Assessment Report
IREP	Interim Reliability Evaluation Program
IRM	intermediate range monitor
ISAP	Integrated Safety Assessment Program
LOCA	loss-of-coolant accident
LPCI	low-pressure coolant injection
MOV	motor-operated valve
msl	mean sea level
NNECO	Northeast Nuclear Energy Company
NRC	Nuclear Regulatory Commission
PMH	Probable Maximum Hurricane
PMP	Probable Maximum Precipitation
POL	provisional operating license
PRA	probabilistic risk assessment
psi	pounds per square inch
RCPB	reactor coolant pressure boundary
RPS	reactor protection system
RG	Regulatory Guide
RWCU	reactor water cleanup
SEP	Systematic Evaluation Program
SER	safety evaluation report
SRP	Standard Review Plan
USI	Unresolved Safety Issue

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INTEGRATED PLANT SAFETY ASSESSMENT REPORT
SUPPLEMENT NO. 1
SYSTEMATIC EVALUATION PROGRAM
MILLSTONE NUCLEAR POWER STATION, UNIT 1

1 INTRODUCTION

The Systematic Evaluation Program (SEP) was initiated by the U.S. Nuclear Regulatory Commission to review the designs of older operating nuclear power plants to reconfirm and document their safety. The review provides (1) an assessment of the significance of differences between current technical positions on safety issues and those that existed when a particular plant was licensed, (2) a basis for deciding how these differences should be resolved in an integrated plant review, and (3) a documented evaluation of plant safety.

The results of the SEP review of Millstone 1 were published in NUREG-0824, the Final Integrated Plant Safety Assessment Report (IPSAR), dated February 1983. The review compared the as-built plant design with current review criteria in 137 different areas defined as "topics." During the review, 51 topics were deleted from consideration in the SEP because a review was being conducted under other programs (unresolved safety issue or Three Mile Island Action Plan tasks), the topic was not applicable to Millstone 1, or the items to be reviewed under that topic did not exist at the site.

Of the original 137 topics, 86 were, therefore, reviewed for Millstone 1; of these, 48 met current criteria or were acceptable on another defined basis. From the review of the 38 remaining topics, certain aspects of plant design were found to differ from current criteria. The review of these 38 topics resulted in 87 individual issues which were considered in the integrated assessment of the plant. The integrated assessment consisted of evaluating the safety significance and other factors of the identified differences from current design to arrive at decisions about whether modification was necessary from an overall plant safety viewpoint. To arrive at these decisions, engineering judgment was used as well as the results of a limited probabilistic risk assessment study.

In general, the staff's positions in the integrated assessment fell into one or more of the following categories: (1) equipment modification or addition, (2) procedure development or Technical Specification changes, (3) refined engineering analysis or continuation of ongoing evaluation, and (4) no modification necessary. Table 4.1 of the IPSAR summarizes the staff's integrated assessment positions and documents the licensee's agreement with those positions.

For those positions classified as either Category (1) or (2), the IPSAR lists the scheduled completion dates agreed upon by the staff and the licensee. Region I has verified the implementation of these positions or identified certain corrective actions required, as described in Section 4.0 of this report.

For those positions classified as Category (3), the licensee has provided the results of their evaluation or engineering analyses. The purpose of this supplement to the IPSAR is to provide the staff's evaluation of the Category (3) issues and to summarize the status of all actions to be implemented as a

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result of the SEP review. In those cases where analyses are continuing, the staff's evaluation identifies the analyses to be performed and the acceptance criteria that will be used to design the optimum plant modifications, if necessary. Any pre-implementation staff reviews required for these ongoing analyses, following this supplement, will be summarized in individual safety evaluation reports as the analyses are completed.

The Millstone 1 facility is one of the seven SEP plants that has not received a full-term operating license (FTOL). Therefore, a Safety Evaluation Report (SER) to support the conversion of the provisional operating license (POL) to an FTOL has been prepared (NUREG-1143). The SER consists of the IPSAR, the IPSAR supplement, a consideration of major plant modifications that have been made, substantive regulations adopted since the POL was issued, the unresolved safety issues and Three Mile Island Action Plan issues.

In a related activity, the licensee proposed in letters dated June 13, 1983, September 14, 1983, December 28, 1983 and May 17, 1985 to conduct an expanded integrated assessment for Millstone 1 which would address the outstanding SEP issues (Category 3), all pending licensing actions, and significant licensee-sponsored plant improvements. This effort is referred to as the Integrated Safety Assessment Program (ISAP).

On November 15, 1984, the Commission published a policy statement in the Federal Register (49 FR 45112) which describes the elements and objectives of ISAP, as a regulatory vehicle to develop plant-specific, integrated implementation schedules for plant modifications. Millstone 1 has been selected as one of two plants which will participate in an ISAP pilot program. Consequently, the results of the licensee's additional analyses for several of the issues discussed in this report refer to ISAP, where alternative corrective actions will be considered and a prioritized implementation schedule for any plant modifications will be developed. The entire scope of the ISAP review for Millstone 1 is detailed in a July 31, 1985 letter to the licensee.

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2 TOPICS THAT REQUIRED REFINED ENGINEERING ANALYSIS OR CONTINUATION OF ONGOING EVALUATION

Table 2.1 of this report presents a list of all issues that were evaluated in the IPSAR. The licensee has submitted an evaluation for each of the items identified in the final IPSAR as requiring additional analysis. A summary of the staff's findings of these items is presented in Sections 2.1 through 2.18 below. Each section references the staff's Safety Evaluation Report if applicable which provides more detail regarding the basis for the staff's conclusions. References for correspondence pertaining to Safety Evaluation Reports (SERs) for each section appear in Appendix A of this report. Factors considered in reaching a staff conclusion for each item include the perceived safety significance of the difference from current licensing criteria and a qualitative assessment of the financial and radiation exposure costs to make a modification. The evaluation of these issues also considered any applicable risk perspectives, developed for the integrated assessment and described in the IPSAR, and related corrective actions proposed by the license as part of the integrated assessment or as a result of the subsequent evaluations.

2.1 Topics II-3.B, Flooding Potential and Protection Requirements; II-3.B.1, Capability of Operating Plants to Cope With Design Basis Flooding Conditions; III-3.A, Effects of High Water Level on Structures (NUREG-0824 Sections 4.1 and 4.5)

As implemented by Standard Review Plan (SRP) Section 2.4.5 (NUREG-0800) and Regulatory Guide (RG) 1.59, General Design Criterion (GDC) 2 in 10 CFR 50, requires that structures, systems and components important to safety be designed to withstand the effects of natural phenomena such as floods.

2.1.1 Flooding Elevation

In IPSAR Section 4.1.1, the staff concluded that the Probable Maximum Hurricane (PMH) flood level, including wave effects, is 22.3 ft msl (18.11 ft msl still-water level plus wave action). Safety-related structures at Millstone 1 are protected by concrete floodwalls to elevation 19.0 ft msl. As a result of this higher water level, including wave effects, it was determined that there could be intermittent inleakage and that the floodwalls have not been analyzed for these additional forces. The licensee submitted information addressing these issues by letters dated February 2, 1984 and March 16, 1984. The licensee relies on the isolation condenser, which is flood protected, to attain safe shutdown for this event. To supply make-up to the isolation condenser, the licensee will use the firewater pumps located in the fire pumphouse. The licensee has further proposed to perform modifications to the flood doors of this structure to assure that it is adequately designed for this event.

By letter dated October 7, 1985, the staff issued its safety evaluation on this issue. The staff concludes that the licensee's proposal is acceptable; however the licensee should confirm that the masonry blockwalls of the fire pumphouse will resist the forces induced by the flood water including wave effects. This concern will be evaluated as part of ISAP Issue 1.19, Integrated Structural Analysis.

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2.1.2 Roofs

Section 4.1.7 of the IPSAR concluded that some roofs with parapets may be overstressed as a result of local Probable Maximum Precipitation (PMP). The licensee analyzed the roofs of safety-related structures and proposed to install scuppers on the roofs of the turbine building, reactor building, warehouse and heating and ventilation area roofs in order to assure that the loads on these roofs remain below the design roof live loads. This course of action is described in the licensee's submittal dated February 2, 1984.

After reviewing the licensee's submittal, the staff concludes that these proposed modifications will adequately limit roof ponding and, therefore, are acceptable. The licensee plans to install the scuppers during the Fall 1985 refueling outage. Confirmation of installation will be made during routine inspections.

2.2 Topic II-4.F, Settlement of Foundations and Buried Equipment (NUREG-0824 Section 4.2)

10 CFR 50 (GDC 2 and 44) and 10 CFR 100, Appendix A as implemented by Regulatory Guide 1.132 and SRP Section 2.5.4, require that foundations and buried equipment important to safety be adequately designed to perform their intended functions.

The IPSAR identified three issues for further evaluation concerning pile foundations and buried pipelines, which are described below. The licensee addressed these three issues in a March 16, 1984 submittal. Upon reviewing the backup calculations, the staff questioned, in discussions with the licensee, the analysis methodology used by the licensee to show adequacy of the piles. The staff also questioned the ability of recent soil borings to detect the possibility of peat beneath the buried pipelines given the depth and location of the borings. The licensee is preparing a new analysis to address the staff concerns and a program to monitor settlement in the area of the buried pipelines. The staff will present the results of its review of these forthcoming submittals in a separate Safety Evaluation Report. This topic is included in the scope of ISAP issues for Millstone 1.

2.2.1 Turbine Building

In IPSAR Section 4.2.1, the staff recommended that the licensee demonstrate that the pile foundation of the turbine building is adequate to resist lateral and uplift loads developed during a safe shutdown earthquake in light of only a 4 inch pile embedment into the pile cap. Additionally, the staff recommended that potential corrosion of the pile be investigated considering the proximity of the sea water to the steel piles. The status of this issue is discussed above.

2.2.2 Gas Turbine Generator Building

IPSAR Section 4.2.2 identified a concern, similar to that described in Section 2.2.1, related to the pile foundation of the gas turbine generator building. Because some of the piles under the gas turbine building are friction piles, the staff required the licensee to demonstrate that they will perform adequately during a dynamic loading considering the possible loss of strength of the saturated granular soils surrounding these piles during an earthquake. The status of this review is discussed above.

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2.2.3 Buried Pipelines

In IPSAR Section 4.2.3, the staff identified an area where safety-related buried pipelines may be supported by peat, a highly compressible material, and potentially subject to unacceptably large settlement. The licensee supplied a summary of the results obtained from recent soil borings in their submittal dated March 16, 1984. The status of this issue is discussed above.

2.3 Topic III-1, Classification of Structures, Systems and Components (NUREG-0824 Section 4.3)

As implemented by Regulatory Guide 1.26, 10 CFR 50 (GDC 1) requires that structures, systems and components important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed.

In Section 4.3 of the IPSAR, the staff concluded that insufficient information existed to complete the topic review in certain areas and recommended that the licensee supply additional information and analyses on the following subjects:

1) radiography
2) fracture toughness
3) valves
4) pumps
5) storage tanks

The staff's position remains as stated in the IPSAR, namely, the licensee should complete the evaluations and incorporate the results in the Final Safety Analysis Report update. If the results indicate that modifications are required, those actions should be reported to the staff. By letter dated April 11, 1985 the staff granted NNECO a six month extension on the required submittal date for the updated Final Safety Analysis Report. This exemption requires the licensee to submit a program plan for the update by October 11, 1985. This topic is included in the scope of ISAP issues for Millstone 1.

2.4 Topic III-2, Wind and Tornado Loadings (NUREG-0824, Section 4.4) and III-4.A, Tornado Missiles (NUREG-0824, Section 4.7)

10 CFR 50 (GDC 2), as implemented by SRP Sections 3.3.1 and 3.3.2 and Regulatory Guides 1.76 and 1.117, requires that the plant be designed to withstand the effects of natural phenomena such as wind and tornados.

IPSAR Sections 4.4.1 through 4.4.6 identified some structures and components important to safety that did not meet current licensing criteria, i.e. tornado winds of 300 mph and differential pressure of 2.25 psi. The following vulnerable areas were identified in the IPSAR:

1) reactor building steel structure above the operating floor
2) ventilation stack
3) effects of failure of non-qualified structures
4) components not enclosed in qualified structures
5) roofs
6) load combinations

The licensee responded to each of the above issues in submittals dated December 3, 1982, October 7, 1983, February 2, 1984, and March 16, 1984.

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Related to the tornado wind issue is the issue of tornado missiles. IPSAR Section 4.7 identified structures and components considered vulnerable to tornado missiles. The staff's position was that the licensee must provide protection for sufficient systems and components to ensure the ability to safely shutdown the plant (i.e., to reach hot shutdown). The licensee addressed the issue of tornado missiles in their submittal dated December 2, 1983.

The licensee has proposed to rely on the isolation condenser as the primary means of achieving safe shutdown for tornado events. As part of this proposal, the licensee intends to provide a connection to the underground city water system and a missile protected pump in the reactor building to provide cooling water for the isolation condenser.

In an evaluation dated November 25, 1985, the staff concluded that the licensee's proposal will provide adequate protection against tornado events. That conclusion is based on (1) the low likelihood of windspeeds which would cause substantial plant damage, (2) the capability of the condensate storage tank (CST) and fire-water tank as alternative cooling water sources, and (3) a protected cooling path to the city water system. However, because of the general importance of the CST and fire-water tank as cooling sources, the staff has recommended that the capability of the anchor bolts to provide substantial resistance against failure be confirmed.

The confirmatory analysis of tank anchor bolts and implementation schedule for the plant modifications associated with the connection to the city water system will be resolved in ISAP.

2.5 Topic III-3.A, Effects of High Water Level on Structures (NUREG-0824 Section 4.5)

10 CFR 50 (GDC 2), as implemented by SRP Section 3.4 and Regulatory Guide 1.59, requires that plant structures be designed to withstand the effects of flooding.

IPSAR Section 4.5.1 identified additional forces that will be applied to the floodwalls as a result of flood levels associated with the PMH. This issue has been addressed in this Supplement in Section 2.1.

In Section 4.5.2 of the IPSAR, the staff required that the licensee determine whether plant structures are capable of withstanding hydrostatic and uplift forces in combination with other loads (e.g., earthquake) resulting from groundwater rising to the grade elevation. By letter dated February 2, 1984, the licensee supplied the results of their analyses which concluded that these structures would adequately withstand the hydrostatic and uplift forces.

The staff has reviewed the licensee's submittal and has identified in its October 7, 1985 evaluation specific areas of the analysis where additional justification is required to ensure adequate margins to accomodate uncertainties in the analysis techniques. This issue will be addressed as part of ISAP issue 1.19, Integrated Structural Analysis.

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2.6 Topic III-4.B, Turbine Missiles (NUREG-0824 Section 4.8)

10 CFR 50 (GDC 4), as implemented by Regulatory Guide 1.115 and SRP Section 3.5.1.3 requires that structures, systems and components important to safety be appropriately protected from dynamic effects including missiles.

While a turbine inspection program was being established generically for General Electric (GE) turbines, the IPSAR concluded that the low-pressure turbine discs and normally inaccessible parts which have not been inspected in the last three years should be inspected at the next refueling outage; based on the results of this inspection, the licensee was to propose a schedule for future inspections. Additionally, the staff recommended that the main steam stop and control valves and reheat stop and intercept valves be disassembled and inspected at approximately 3-year intervals and be exercised at least weekly by full closure of the valves. By letter dated September 29, 1982, the licensee informed the staff that inspections and tests of the main steam stop, reheat stop, and intercept valves were being performed in accordance with the staff's position; however, the control valves are not tested by fully closing the valves.

The staff requested in the IPSAR that the licensee evaluate the potential improvement in control valve availability associated with weekly full-closure testing and the feasibility of conducting such tests.

The licensee responded by letters dated June 22, 1983 and December 5, 1984. In the June 22, 1983 letter, the licensee concluded that no changes to the current testing program are warranted for the following reasons:

- At rated power and steam flow, the main steam control valve position is approximately 70% of full open. Due to the design and flow characteristics of these valves, this valve position does not mean that 30% of flow capacity remains. Close to rated steam flow, very small changes in steam flow result in large changes in valve position. A major reduction in reactor power would be required to insure that control valve capacity is not reached, which could result in a reactor pressure transient and subsequent neutron hi-hi flux scram.

- The above condition could be avoided by opening the turbine bypass valves during the test period. This alternative is not desirable, however, due to the high potential for main condenser tube failure. Past operating experience has demonstrated that bypassing steam to the main condenser at high flow rates can cause degradation and subsequent tube leaks, which may result in chloride contamination and high conductivity in the main condenser.

- The response time of the pressure regulating system and the control valves has not been adequately demonstrated. Additional testing would be required to determine whether the pressure regulating system will allow opening of the remaining control valves before a reactor pressure increase and possible reactor scram could occur.

- Closure of one main steam control valve can result in an imbalance in inlet steam to the high pressure turbine. The effect of this evolution on turbine reliablity is not known; however, NNECO has requested an evaluation of this transient from the turbine vendor.

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- The main steam control valves serve to control reactor pressure and thus modulate constantly in response to changes in steam flow. Therefore, any malfunction in the main steam control valve would be noticed by the operator and corrective action would be taken. The fact that these valves are continually changing position provides additional assurance that they will close properly on demand to isolate the steam supply from the turbine.

- The main steam stop valves and reheat stop and intercept valves are cycled to the fully closed position once per week, thus assuring their reliability. Closure of these valves alone would be sufficient to isolate the turbine and prevent a severe overspeed condition.

In the December 5, 1984 letter, the licensee stated that the "A" low pressure turbine had been ultrasonically inspected in 1982 and that the "B" low pressure and high pressure turbines were similarly inspected in 1980. During the 1984 refueling outage, the high pressure turbine was inspected using the magnetic particle technique. Based on the results of these inspections, GE has recommended that the "B" low pressure turbine be inspected during the 1985 refueling outage and that the "A" low pressure turbine be inspected during the 1987 refueling outage. The high pressure turbine will be inspected during the 1989 refueling outage. This schedule provides for the inspection of all three turbines over the next three refueling outages.

The staff will complete its evaluation of this issue for Millstone 1 when the licensee submits the additional information being developed by the turbine manufacturer (GE), as described previously. In a related effort, the staff is continuing its review of the generic methods being developed by GE to establish turbine surveillance and maintenance schedules. When these generic efforts are complete, the results will be appropriately applied to all operating plants with GE turbines, including Millstone 1. In the interim, the staff concludes that the proposed inspection schedules are acceptable; however, the licensee should continue to monitor developments from the generic program and modify the inspection schedules, as necessary.

2.7 Topic III-5.A, Effects of Pipe Break on Structures, Systems and Components Inside Containment (NUREG-0824 Section 4.9)

10 CFR 50 (GDC 4), as implemented by SRP Section 3.6.2, requires, in part, that structures, systems and components important to safety be appropriately protected against dynamic effects such as pipe whip and discharging fluids.

In IPSAR Section 4.9, the staff identified three areas requiring further evaluation. The three areas were related to: 1) cascading pipe breaks, 2) jet impingement, and 3) pipe whip. The licensee submitted the necessary information by letter dated April 15, 1983 and the staff issued its SER on June 29, 1983.

2.7.1 Cascading Pipe Breaks

In IPSAR Section 4.9.1, the staff was unable to conclude whether cascading pipe breaks would produce conditions more severe than those analyzed by the limiting design basis loss-of-coolant accident (LOCA). The staff also required that any leakage detection systems deemed necessary should be reviewed in conjunction with SEP Topic V-5, "Reactor Coolant Pressure Boundary Leakage Detection."

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The licensee's evaluation concluded that the emergency core cooling systems are physically isolated from each other in such a way that any cascading breaks that impact on one train could not affect the redundant train. Also, leakage in one recirculation loop cannot impact the other loop and cascading breaks that impact on one recirculation loop cannot impact the other loop. Therefore, sufficient safe shutdown capability exists to mitigate the consequences of cascading breaks. The licensee also concluded that the ECCS core cooling analysis would not be significantly changed due to cascading breaks and that the potential for cascading breaks does not compromise the design basis accident analysis.

Based on a review of the licensee's evaluation the staff concludes that the licensee has presented adequate justification to provide reasonable assurance that cascading pipe break effects will not create conditions more severe than those analyzed.

2.7.2 Jet Impingement

IPSAR Section 4.9.2 identified four areas of the licensee's jet impingement analysis which required further justification. These areas are:

(1) The jet impingement model used by the licensee was based on a jet expansion caused by longitudinal breaks; current criteria require the consideration of both circumferential and longitudinal breaks.

(2) In the case of circumferential breaks, jets in conjunction with pipe whip were not considered to sweep the arc traveled by the whip.

(3) The assumptions used by the licensee appears to refer only to steam jets rather than all high-energy lines.

(4) From the information presented, it was uncertain whether the jet impingement effects on the impinged target pipe system conformed with the pipe size criterion presented in the letter transmitted to the licensee on January 4, 1980.

The licensee's response to these issues was as follows:

(1) The licensee affirmed that its high energy pipe break analysis did, in fact, consider jet impingement due to both longitudinal and circumferential breaks.

(2) Jets resulting from circumferential breaks were assumed to sweep the arc traveled by the whipping pipe.

(3) Jet impingement effects were considered for all high energy line breaks.

(4) Although it is the licensee's position that the consideration of jet impingement independent of pipe size is not a valid concern, an evaluation of the effects of jet impingement on piping targets was performed. Because of the physical separation of the ECCS trains, the licensee determined that jet impingement could not result in the loss of both trains of either safety system. Therefore, the licensee concluded that the plant could achieve a safe shutdown when considering the effects of jet impingement on piping without consideration of the ratio of pipe sizes.

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Based on the review of the information provided by the licensee, the staff concludes that these issues have been satisfactorily resolved.

2.7.3 Pipe Whip

In IPSAR Section 4.9.3, the staff required that the licensee evaluate the potential for and the consequences of pipes whipping into the drywell liner. The licensee's prior conclusion that high energy line breaks would not penetrate the drywell liner and thus violate containment integrity was based on a test of loads being applied to a spherical shell. The staff recommended that further justification be developed to demonstrate that the test conditions were applicable to the pipe break scenarios for Millstone 1.

In the test, the load was applied over a 14" diameter area and the shell deformed until it made contact with the concrete backing (3" gap). The staff was concerned that in the case of the application of a concentrated dynamic load over a small area, the steel plate may be perforated before the deformation could be backed up by the concrete shielding wall. Also, the test shell thickness was 3/4" and parts of the Millstone 1 liner are not as thick.

The licensee noted in their submittal dated April 15, 1983 that it is not possible for the broken end of a pipe to impinge directly on the liner since the broken end is never the leading surface of the pipe. The thickness of the drywell liner plate varies from 11/16" to 1-7/16" and the gap between the liner and the concrete is only 2". Where the liner is less than 3/4", interactions between large bore piping and the liner plate occur at oblique angles such that only a fraction of the pipe whip energy is transmitted to the plate.

Based on review of this response and the analysis submitted previously, the staff concludes that the licensee has demonstrated that postulated high energy line breaks inside containment will not penetrate the drywell liner and, thus, this issue has been satisfactorily resolved.

2.8 Topic III-5.B, Pipe Break Outside Containment (NUREG-0824 Section 4.10)

10 CFR 50 (GDC 4) as implemented by SRP Sections 3.6.1 and 3.6.2 and Branch Technical Positions MEB 3-1 and ASB 3-1, requires in part, that structures, systems and components important to safety be designed to accommodate the dynamic effects of postulated pipe ruptures.

The issue from Section 4.10.2 of the IPSAR was that the jet impingement model used by the licensee was less conservative than that specified by current criteria. In that section, the staff recommended that the licensee: 1) validate the Millstone 1 jet impingement evaluation methods, 2) demonstrate that the differences between the criteria used and those in SRP Section 3.6.2 are not significant from the standpoint of consequences on systems, or 3) perform augmented ISI to demonstrate that unstable pipe failure is unlikely and implement local leakage detection.

The licensee submitted the results of its evaluation by letter dated March 24, 1983, and the staff issued its SER on June 29, 1983.

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The licensee stated that the difference in cross-sectional area in its model does not significantly alter the results, because conservatisms in the analysis (jet propogation losses, consequence evaluation) more than compensate for any non-conservatism in the jet expansion model. Typically, jet impingement loads were determined for interactions with structures. In these cases, either the load resulted in failure (so remedial measures were required) or there was substantial margin. Thus, based on review of the licensee's March 24, 1983 submittal, the staff has not identified any jet impingement interactions that were judged acceptable by the licensee's analysis that would result in unacceptable consequences if the jet load were proportionately increased to the change in cross-sectional area consistent with current criteria.

The staff, therefore, considers this issue acceptably resolved.

2.9 Topic III-6, Seismic Design Considerations (NUREG-0824 Section 4.11)

10 CFR 50 (GDC 2) and 10 CFR 100 Appendix A, as implemented by SRP Sections 2.5, 3.7, 3.8, 3.9, and 3.10 and SEP review criteria (NUREG/CR-0098), require that structures, systems and components important to safety be designed to withstand the effects of natural phenomena such as earthquakes.

IPSAR Section 4.11 identified the following specific areas as requiring further analysis:

1) pile foundations
2) motor operated valves
3) transformer and control room panels
4) qualification of cable trays
5) reactor vessel internals

The licensee has submitted the results of analyses, as described in the following subsections, to demonstrate that the structures and equipment of concern are capable of withstanding the site-specific earthquake for Millstone 1, developed as part of the Topic III-6 evaluation. The staff's review of this information is nearly complete. In a few cases, additional information is necessary to complete the review. The staff will present the results of this review in a separate Safety Evaluation Report. Information developed from these analyses is also related to the foundation capacity (Section 2.2) and load combinations (Section 2.10). The results of these related evaluations will be addressed in ISAP, as discussed in the introduction to this report.

2.9.1 Pile Foundations

IPSAR Section 4.11.1 identified concerns related to the adequacy of the pile foundation of the turbine building. The concerns are the same as those discussed in Section 4.2 of the IPSAR and are addressed in Sections 2.2.1 and 2.2.2 of this supplement.

2.9.2 Motor-Operated Valves

In Section 4.11.2 of the IPSAR, the staff required that the licensee demonstrate that the structural integrity of motor operated valves that are in lines 4 inches or smaller is adequate. By letter dated May 17, 1984, the licensee submitted the results of their review to the staff.

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2.9.3 Transformers and Control Room Panels

Section 4.11.4 of the IPSAR required demonstration of anchorage system adequacy for transformers and control room panels during a seismic event. The licensee had previously provided information to the staff by letter dated September 29, 1982, which was under review at the time of IPSAR publication. Subsequently, the staff requested additional information from the licensee regarding this matter.

2.9.4 Qualification of Cable Trays

IPSAR Section 4.11.6 required the licensee to submit a plant-specific implementation program and schedule regarding the seismic qualification of cable trays. The licensee submitted final reports, on behalf of the SEP Owners Group, describing cable tray testing and results of the program on qualification of cable trays. The licensee has concluded that the testing and analyses conducted as part of the SEP Owners Group program adequately demonstrates the seismic capability of the cable trays in SEP plants. The staff is reviewing the results of the SEP cable tray program in concert with the generic resolution of Unresolved Safety Issue (USI) A-46, "Seismic Qualification of Equipment in Operating Plants," which will apply to all operating plants. When a generic resolution for USI A-46 is approved, the staff will determine whether any additional action is required to resolve the SEP cable tray program in a consistent manner.

2.9.5 Reactor Vessel Internals

In IPSAR Section 4.11.8, the staff was unable to conclude that reactor vessel internals are adequate to resist a seismic event due to a lack of information. The licensee provided the required information by letter dated January 23, 1984.

2.10 Topic III-7.B, Design Codes, Design Criteria and Load Combinations (NUREG-0824 Section 4.12)

10 CFR 540 (GDC 1, 2 and 4), as implemented by SRP Section 3.8, requires that structures, systems and components be designed for the loadings they may experience and that they conform to applicable codes and standards.

As described in IPSAR Section 4.12, during the integrated assessment, the licensee proposed to perform, on a sampling basis, an evaluation of the code, load and load combination issues delineated by the staff in order to assess the adequacy of as-built structures at Millstone 1. By letter dated February 2, 1984, the licensee supplied the results of their review.

The staff's review of this information has identified a few areas where additional information or justification is necessary in order to complete the evaluation and demonstrate that the margin of safety is adequate for the affected codes, criteria and load combinations. The results of this review will be presented in a separate Safety Evaluation Report.

2.11 Topic III-10.A, Thermal Overload Protection for Motors of Motor-Operated Valves (NUREG-0824 Section 4.14)

10 CFR 50.55a(h), as implemented by Institute of Electrical and Electronics Engineers (IEEE) Standard 279-1971 and 10 CFR 50 (GDC 13, 21, 22, 23, and 29), requires that protective actions be reliable and precise and that they satisfy

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the single failure criterion using quality components. Regulatory Guide 1.106 presents the staff position on how thermal-overload protection devices can be made to meet these requirements.

In IPSAR Section 4.14, the staff found that, of 59 safety-related motor-operated valves (MOVs), 12 are not normally in their emergency position and have thermal-overload protection devices that are not bypassed by an emergency signal nor has it been shown that their trip setpoints were conservatively set. The licensee proposed to analyze the trip setpoints and modify, where necessary, thermal overload protection devices. The analysis is to include a demonstration that proper thermal overload protection devices have been selected, that their trip setpoints have been conservatively set and a summary of the operating experience for each of the 12 valves.

By letter dated August 13, 1985, NNECO provided an assessment of this issue. As discussed in the safety evaluation dated September 16, 1985, the staff concludes that the thermal overload setpoints have been conservatively established such that there is reasonable assurance the valves will operate under accident conditions. Therefore, this issue is resolved.

2.12 Topic VI-4, Containment Isolation System (NUREG-0824 Section 4.20)

10 CFR 50 (GDC 54, 55, 56, and 57), as implemented by SRP Section 6.2.4 and Regulatory Guides 1.11 and 1.141, requires isolation provisions for the lines penetrating primary containment to maintain an essentially leaktight barrier against the uncontrolled release of radioactivity to the environment.

2.12.1 Remote Manual Valves

IPSAR Section 4.20.3 identified various lines that are equipped with remote manual valves rather than automatic isolation valves. Since these lines serve an essential emergency core cooling function, the staff agrees that automatic isolation valves should not be used. However, the staff concluded that adequate leakage detection and procedures for operator action should be demonstrated and the operating station should be located in an accessible area, where necessary.

The licensee responded to this issue by letter dated February 23, 1983. Based on this information, the staff's SER dated July 7, 1983, concluded that adequate detection devices exist in the form of pressure and flow indications, surge tank levels, and sump alarms for the lines in question. These alarms and the operating station for the valves in question are located in the control room. Thus, operation of these valves is possible during an accident. Additionally, plant procedures exist which describe the circumstances under which these lines should be isolated. Therefore, the staff considers this issue adequately resolved.

2.12.2 Lack of Information

In IPSAR Section 4.20.7, the staff identified branch lines associated with two penetrations where the isolation capability was unknown.

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In a letter dated June 22, 1983, the licensee concluded that adequate isolation exists for penetration X-211A because the branch lines off this line have two normally closed valves in series outside the containment but that adequate isolation does not exist for penetration X-204. To correct this deficiency, the licensee has proposed to move the branch lines in question from their current point of connection to new branching positions outside of the containment isolation boundary valves.

The licensee has further requested that this modification be deferred to ISAP, as described in the introduction to this report, to reassess the benefits of this modification relative to related issues. The staff agrees that this deferral is appropriate.

2.13 Topic VI-7.A.3, Emergency Core Cooling System Actuation System (NUREG-0824 Section 4.21)

10 CFR 50.55a(h), as implemented by IEEE Standard 279-1971 and 10 CFR 50 Appendix A (GDC 37), as implemented by Regulatory Guide 1.22, require that equipment important to safety be tested periodically to ensure the operability of the system as a whole and to verify, under conditions as close to design as practical, the performance of the full operational sequence that brings the system into operation, including the operation of the associated cooling water system.

IPSAR Section 4.21.1 concluded that the Millstone 1 Technical Specifications did not require the testing of the core spray system pump space coolers which are part of the turbine building secondary closed cooling water system (cooled by the service water system).

The licensee provided information by letter dated December 3, 1982, to demonstrate that ventilation is not required in the corner rooms of the reactor building to ensure core spray and LPCI pump operability. The basis for this conclusion relies on tests that were performed during initial plant start-up in late 1970.

The staff reviewed this information and transmitted the results of this review to the licensee by letter dated July 5, 1983. Even though worse conditions than those used in the test are possible, such conditions coincident with the need for this equipment are unlikely. Additionally, redundant equipment, serviced by a separate cooling system, is available to perform the safety function. On this basis, the staff concludes that this issue has been adequately resolved.

2.14 Topic VI-7.C.1, Appendix K-Electrical Instrumentation and Control Re-reviews (NUREG-0824 Section 4.23)

10 CFR 50 (GDC 2, 4, 17, and 18) as implemented by SRP Sections 8.2 and 8.3 and Regulatory Guide 1.6, requires that redundant load groups and the redundant standby electrical power sources be independent at least to the following extent:

(1) No provisions should exist for automatically connecting one load group to another load group.

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(2) No provisions should exist for automatically transferring loads between redundant power sources.

(3) If means exist for manually connecting redundant load groups together, at least one interlock should be provided to prevent an operator error that would parallel their standby power sources.

The bases for these requirements include the following:

(1) There is evidence based on operating experience and analytical considerations that the parallel operation of standby power sources renders them vulnerable to common-mode failures. Current designs are, therefore, based on the concept of independent, redundant load groups. In these designs, the standby power source for one load group is never automatically interconnected under accident conditions with the standby power source of a redundant counterpart.

(2) There can be compromises of independence resulting from automatic bus ties that connect the loads of one load group to the power source of another in the event the power source of the first load group has failed. The slightly improved defense against random failures achieved by these bus ties is more than offset by the additional vulnerability to common-mode failures that they create.

2.14.1 Automatic Bus Transfers

IPSAR Section 4.23.1 identified buses that are supplied by automatic-transfer switches that can transfer loads between redundant sources. The staff required that the licensee evaluate the design of the automatic bus transfer (ABT) devices and identify any necessary corrective action.

In a letter dated April 12, 1983, as supplemented by a letter dated December 6, 1983, the licensee identified actions such as a breaker coordination study to resolve this issue. The licensee stated that a project is currently planned at Millstone 1 to analyze and document the circuit breaker coordination for the ABTs.

The results of the licensee's circuit breaker coordination analysis and possible corrective actions will be evaluated with related issues in ISAP, as described in the introduction to this report.

As discussed in IPSAR Sections 4.23 and 4.26, Millstone 1 has a single instrument ac bus. Thus, failure of this bus may result in loss of essential instrumentation needed for plant shutdown. This issue was addressed by taking credit for local indications of vital parameters to enable plant operators to achieve and maintain safe shutdown conditions in the event of bus failure. As part of the ISAP review of bus transfers, the need for a redundant instrument ac bus will be evaluated by the licensee.

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2.14.2 Manual Bus Transfers

In IPSAR Section 4.23.2, the staff identified three load centers that are manually transferred between redundant sources. Although they are under administrative control, there are no interlocks to prevent operator error that would parallel the emergency sources.

By letter dated April 12, 1983, the licensee concluded that the present configuration provides an adequate level of independence between the dc systems because the plant operates with the emergency transfer source deenergized.

The staff will evaluate the licensee's conclusion for this issue relative to related issues under ISAP, as described in the introduction to this report.

2.15 Topic VII-1.A, Isolation of Reactor Protection System From Non-Safety Systems, Including Qualifications of Isolation Devices (NUREG-0824 Section 4.25)

10 CFR 50.55a(h), through IEEE Std. 279-1971, requires that safety signals be isolated from nonsafety signals and that no credible failure at the output of an isolation device shall prevent the associated protection system channel from meeting the minimum performance requirements specified in the design bases.

IPSAR Section 4.25.1 concluded that at Millstone Unit 1, there were no isolation devices between the nuclear flux monitoring systems and the process recorders and indicating instruments, nor were there any between the average power range monitor (APRM) system and the process computer.

The licensee proposed to conduct tests to determine if adequate isolation exists for these circuits.

By letter dated January 31, 1984, the licensee supplied the results of their testing and their bases for concluding that modifications are not warranted. In summary, the licensee concluded that although isolation between the components does not exist, the probability of hot shorts of 125V dc or 120V ac is remote and electrical failures due to inadequate isolation do not contribute significantly to the overall reactor protection system (RPS) failure probability.

The staff will evaluate the licensee's conclusion for this issue relative to related issues under ISAP, as described in the introduction to this report.

2.16 Topic VIII-2, Onsite Emergency Power Systems (NUREG-0824 Section 4.28)

10 CFR 50 (GDC 17), as implemented by SRP Section 8.3.1 and BTP ICSB 17, requires that:

(1) The design of standby diesel generator systems should retain only the engine overspeed and the generator differential trips and bypass all other trips under an accident condition.

(2) If other trips, in addition to the engine overspeed and generator differential trips, are retained for accident conditions, an acceptable design should provide two or more independent measurements of each of the trip parameters. Trip logic should be such that a diesel generator trip would require specific coincident logic.

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In addition, GDC 17, as implemented by IEEE Std. 279-1971, requires that all the conditions that might render the emergency power generator incapable of automatic starting shall be unambiguously annunciated in the control room.

All current licensing criteria for emergency onsite power have been developed for a diesel generator. At Millstone Unit 1, one of the two emergency onsite generators is powered by a gas turbine. There are no specific staff criteria for a gas turbine generator.

In IPSAR Section 4.28.3, the staff noted that many of the types of gas turbine failures that have occurred may be eliminated with an effective preventive maintenance program. Thus, the staff concluded that such a program should be implemented or, if one already exists, the licensee should review the program for possible improvement.

The licensee responded by letters dated May 10, 1983 and June 20, 1983. In these responses, the licensee proposed changes in their preventive maintenance program regarding the engine mounted fuel pump, fuel shutoff valve, air start regulating valve, air receiver and control circuit timers.

By letter dated August 16, 1984, the staff concluded that the revised maintenance program acceptably resolves this issue.

Bypass under accident conditions of the light-off speed and generator excitation trips, the high lube oil temperature trip and of five gas turbine generator output breaker protective trips is issue 1.01 in ISAP.

2.17 Topic VIII-3.B, DC Power System Bus Voltage Monitoring and Annunciation (NUREG-0824 Section 4.30)

10 CFR 50.55a(h), through IEEE Std. 279-1971, and 10 CFR 50 (GDC 2, 4, 5, 17, 18, and 19), as implemented by SRP Section 8.3.2, Regulatory Guides 1.6, 1.32, 1.47, 1.75, 1.118, and 1.129, and BTP ICSB 21, require that the control room operator be given timely indication of the status of the station batteries.

In IPSAR Section 4.30 the staff concluded that the Millstone 1 control room did not have all of the alarms and indications of dc power system status recommended by current criteria. As discussed in IPSAR Section 4.30.1, the licensee evaluated the need to provide battery current alarms/indications in their December 27, 1982 submittal, and concluded that present indications in the control room are sufficient.

The staff will consider the licensee's conclusion for this issue relative to related issues under ISAP, as described in the introduction to this report.

2.18 Topic IX-5, Ventilation Systems (NUREG-0824 Section 4.32)

10 CFR 50 (GDC 4, 60 and 61), as implemented by SRP Sections 9.4.1, 9.4.2, 9.4.3, 9.4.4, and 9.4.5, requires that the ventilation systems shall have the capability to provide a safe environment for plant personnel and for engineered safety features. The staff's review of the ventilation systems for Millstone 1 found them acceptable except for the four items discussed below.

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The Millstone Interim Reliability Evaluation Program (IREP) considered failure of safety systems resulting from inadequate ventilation and did not identify any systems where ventilation was a concern. However, additional information was necessary in some cases to confirm the assumptions and judgments in the Probabilistic Risk Assessment (PRA).

The licensee responded to the identified ventilation issues by letter dated April 18, 1983 and the staff issued its SER on July 5, 1983.

2.18.1 Core Spray and LPCI Systems Ventilation Systems

This issue is identical to that discussed in Section 2.15 in this supplement. Conclusions given in that section also apply here.

2.18.2 Reinitiation of Ventilation Following Loss of Offsite Power

In IPSAR Section 4.32.2, the staff required that the licensee define the maximum period the turbine building ventilation system could be inoperative and still assure that the equipment serviced would continue to function, as necessary. In addition, the staff concluded that the licensee should demonstrate that the amount of hydrogen generated as a result of battery charging during that period would not exceed the minimum combustion limit.

The results of the licensee's evaluation indicated that the components which contribute the largest heat loads in the turbine building during a loss of offsite power event are the 480 volt load centers 1, 2 and 2A, and the load center and switchgear heaters. The licensee's analysis of the heat gain in the area of this equipment, during a summer period indicated that the ambient temperature would increase to 104°F (design temperature) in approximately 30 minutes. Of these heat sources, all of the load center and switchgear heaters and 480 volt load centers 1 and 2 receive power from the gas turbine generator. Only the 480 volt load center 2A is powered by the diesel generator. The evaluation that was performed for this area assumed that both the diesel and the gas turbine start and run.

However, the licensee's evaluation found that, in the event the gas turbine is not started, the heat loads in this area would be significantly reduced (i.e., loss of heaters and load centers 1 and 2) to the point where ventilation in the area would not be required. Therefore, since ventilation in this area is required only when the gas turbine generator is operating, and sufficient time (a minimum of 30 minutes) is available for operator action, the licensee committed to revise the plant operating procedures to instruct the operator to start both the supply and exhaust ventilation fans in the switchgear area if the gas turbine is started during a loss of offsite power event.

With respect to the accumulation of hydrogen, the licensee calculated the maximum rate of hydrogen production in each battery room and concluded that it would require considerable time for hydrogen concentration to reach a combustible concentration. Due to the low hydrogen production rate and the presence of the combustible gas detector systems, the staff concludes that sufficient time (i.e., days) is available for the operator to either restore offsite power or to successfully start the diesel generator to provide ventilation before the limit of combustion is reached.

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Based on the staff's review of this information and the licensee's commitment to modify the plant operating procedures, the staff considers these issues acceptably resolved.

2.18.3 FWCI and Diesel Generator Area Coolers

In IPSAR Section 4.32.3, the staff indicated that insufficient information was provided on the design and operation of the area space coolers for the feedwater coolant injection (FWCI) and diesel generator areas. Subsequently, the licensee evaluated the design and operation of both area cooling systems.

As a result of the licensee's review of the space coolers in the diesel generator area, it was determined that both area coolers are automatically sequenced into the diesel generator. Each area cooler has a heat removal capacity of 500,000 BTU/hr, which is sufficient to cool this area without requiring the ventilation system to be operable. Therefore, this issue is resolved.

The licensee's evaluation of the heat gain in the vicinity of the FWCI components, during the summer indicated that the area coolers (HVH 3, 3A, 4, 4A, 5, and 5A) must be operable to maintain these areas below the 104°F design temperature. The cooling capacity of these area coolers is sufficient even with the loss of one cooler. If the area coolers are operating, the ventilation system is not essential; however, the heat removal capacity of the ventilation system alone is not sufficient to cool these areas without operation of the area coolers.

The FWCI space coolers do not presently receive emergency power; consequently, the licensee committed, by letter dated April 18, 1983, to modify the units so that the area coolers will be automatically sequenced onto the gas turbine generator. The proposed modification will resolve this issue; implementation will be scheduled in accordance with the ISAP review (issue 1.05).

2.18.4 Intake Structure Ventilation System

In IPSAR Section 4.32.4, the staff indicated that sufficient information was not provided to support the licensee's position that active ventilation is not required for the intake structure.

The licensee subsequently evaluated the heat buildup in the intake structure during the summer due to operation of the service water and emergency service water pumps and has determined that starting one of the 20,000 cfm exhaust fans will provide sufficient cooling. Operation of only one fan will provide a complete air change in the affected area in approximately four (4) minutes.

The two 20,000 cfm exhaust fans (HVR 8 and 9) do not presently receive power from an emergency bus. The licensee committed in the April 18, 1983 letter to modify the exhaust fans so that one unit is automatically sequenced onto the diesel generator and the other unit is automatically sequenced onto the gas turbine generator.

The modification will resolve this issue; implementation will be scheduled in accordance with the ISAP review (issue 1.05).

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Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
II-3.B, II-3.B.1, II-3.C	4.1.1	Flooding Elevation	Determine the effects of probable maximum hurricane (PMH) wave inleakage and identify any necessary corrective actions.	2.1.1	Assure structural adequacy of masonry walls in fire pumphouse. (ISAP Issue 1.19)
			Provide analysis of PMH wave structural effects. (See Sections 4.6 and 4.12.)		None
	4.1.2	Intake Structure	None	---	
	4.1.3	Local Flooding	None	---	
	4.1.4	Gas Turbine Building	None	---	
	4.1.5	Diesel Fuel Oil	None (See Section 4.1.6.)	---	
	4.1.6	Emergency Procedures	Revise the flood emergency procedures to address the topic concerns and implement the revised procedures.	4.0	Procedural change complete.
	4.1.7	Roofs	Determine the adequacy of roofs subjected to ponding resulting from the local probable maximum precipitation (PMP). (See Section 4.12.)	2.1.2	Install scuppers on selected roofs. (1985 Refueling Outage)
II-4.F	4.2.1	Turbine Building	Evaluate structural capability of the piles supporting the building. (See Section 4.12.)	2.2.1	Under staff review. (ISAP issue 1.19)
	4.2.2	Gas Turbine Generator Building	Evaluate structural capability of the piles supporting the building. (See Section 4.12.)	2.2.2	Under staff review. (ISAP Issue 1.19)

Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
	4.2.3	Buried Pipelines	Conduct soil investigation in area of the safety-related water pipelines where they may be underlain by peat. (See Section 4.12.)	2.2.3	Awaiting information from licensee. (ISAP Issue 1.19)
III-1	4.3.1	Radiography Requirements	Perform a volumetric inspection of all Class 1 and 2 piping, and valves and Class 2 vessels not volumetrically inspected previously. Document in FSAR update.	2.3	Same (ISAP Issue 1.15)
	4.3.2	Fracture Toughness	Identify and replace, if necessary, the components that do not meet fracture toughness requirements. Document in FSAR update.	2.3	Same (ISAP Issue 1.15)
	4.3.3	Valves	Evaluate design of Class 1, 2, and 3 valves on a sampling basis; upgrade if necessary. Document in FSAR update.	2.3	Same (ISAP Issue 1.15)
	4.3.4	Pumps	Analyze the design safety margins of the specified pumps. Document in FSAR update.	2.3	Same (ISAP Issue 1.15)
	4.3.5	Storage Tanks	Evaluate design of specified tanks. Document in FSAR update.	2.3	Same (ISAP Issue 1.15)

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Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
III-2	4.4.1	Reactor Building Steel Structures Above the Operating Floor	Analyze the specified structures capabilities to resist tornado loads and propose corrective actions, if necessary. (See Section 4.12.)	2.4	Provide protected safe shutdown train and assure adequacy of CST and firewater tank anchor bolts. (ISAP Issue 1.02)
	4.4.2	Ventilation Stack	Submit analyses demonstrating capability to achieve and maintain safe shutdown of Units 1 and 2 case of a tornado-induced failure of the stack. (Analysis submitted--under staff review.)	2.4	Same as 4.4.1
	4.4.3	Effects of Failure of Nonqualified Structures	Provide an analysis of the effects and any corrective actions that may be necessary.	2.4	Same as 4.4.1
	4.4.4	Components Not Enclosed in Qualified Structures	Determine the adequacy of the components and identify any corrective actions that may be necessary.	2.4	Same as 4.4.1
	4.4.5	Roofs	Determine the adequacy of roofs of Category I structures. (See Section 4.12.)	2.4	Same as 4.4.1
	4.4.6	Load Combinations	Demonstrate that wind loads were properly combined with other specified loads or identify any necessary corrective action. (See Section 4.12.)	2.4	See Section 2.10. (ISAP Issue 1.19)

Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
III-3.A	4.5.1	Flood Elevation	Provide analysis of PMH wave structural effects and identify any necessary corrective actions. (See Sections 4.1.1 and 4.12.)	2.5	See Section 2.1.1
	4.5.2	Groundwater	Demonstrate appropriate consideration of hydrostatic forces on a sampling basis. (See Section 4.12.)	2.5	Provide additiona justification of margin. (ISAP Issue 1.19)
III-3.C	4.6.1	Deficiencies Noted	Determine the adequacy of roofs subjected to ponding resulting from the local PMP. (See Section 4.12 and 4.1.7.)	2.1.2	Install scuppers on selected roofs. (To be installed during Fall 1985 refueling outage)
	4.6.2	Structures and Components Requiring Inspection	Revise procedure to include inspection of floodwalls. (See Section 4.6.3.)	4.0	Procedural change complete.
	4.6.3	Inspection Program	Develop and submit an improved inspection program for water control structures.	4.0	Inspection program complete.
III-4.A	4.7	Tornado Missiles	Evaluate protection of systems and components to ensure the capability to safely shutdown the plant via a tornado-missile-protected path.	2.4	Provide safe shutdown train.
			Modify as necessary to provide a tornado-missile-protected shutdown path.	2.4	Provide safe shutdown train. See Section 2.4 (ISAP Issue 1.02)
III-4.B	4.8	Turbine Missiles	Inspect turbine and propose frequency based on results.	2.6	None

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Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
III-4.B	4.8	Turbine Missiles	Evaluate the improvement in control valve availability associated with full closure testing and feasibility of conducting such tests.	2.6	Awaiting further information from turbine manufacturer.
III-5.A	4.9.1	Cascading Pipe Breaks	Submit an analysis of cascading pipe breaks.	2.7.1	None
	4.9.2	Jet Impingement	Provide information specified.	2.7.2	None
	4.9.3	Pipe Whip	Provide an analysis of the potential for and consequences of pipes whipping into the drywell liner.	2.7.3	None
III-5.B	4.10.1	Moderate-Energy Piping	None	---	
	4.10.2	Jet Impingement	Submit a review of affected jet impingement analysis.	2.8	None
	4.10.3	Unisolable Breaks	None	---	
III-6	4.11.1	Pile Foundations	Evaluate structural capability of piles supporting the turbine and gas turbine buildings. (See Sections 4.2.1, 4.2.2, and 4.12.)	2.9.1	None (See Section 2.2.1 and 2.2.2) (ISAP Issue 1.19)
	4.11.2	Motor-Operated Valves	Demonstrate valve structural integrity.	2.9.2	Under staff review. (ISAP Issue 1.06)
	4.11.3	Low-Pressure Coolant Injection/Containment Spray Heat Exchangers	None	---	

Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
III-6	4.11.4	Transformer and Control Room Panels	None (staff is reviewing).	2.9.3	Under staff review. (ISAP Issue 1.06)
	4.11.5	Ability of Safety-Related Electrical Equipment to Function.	None	---	
	4.11.6	Qualification of Cable Trays	Provide plan to implement results of SEP Owners Group Program.	2.9.4	None
	4.11.7	Recirculation Pump Supports	None	---	
	4.11.8	Reactor Vessel Internals	Provide a seismic analysis of the reactor vessel internals.	2.9.5	Under staff review. (ISAP Issue 1.06)
III-7.B	4.12	Design Codes, Design Criteria, Load Combinations and Reactor Cavity Design Criteria	Evaluate adequacy of original design criteria on a sampling basis for specified structural elements; provide information requested in Topics II-3.B, II-4.F, III-2, III-3.A, and III-6 that has been deferred to this topic.	2.10	Under staff review. (ISAP Issue 1.19)
III-8.A	4.13	Loose-Parts Monitoring and Core Barrel Vibration Monitoring	None	---	
III-10.A	4.14	Thermal-Overload Protection for Motors of Motor-Operated Valves	Demonstrate proper setting of thermal-overload trip setpoints and discuss operating experience of specified valves. Implement modifications found to be necessary.	2.11	None

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Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
IV-2	4.15	Reactivity Control Systems, Including Functional Design and Protection Against Single Failures	None	---	
V-5	4.16.1	Systems Currently Available at Millstone Unit 1	Provide at least one leakage detection method that is qualified to a safe shutdown earthquake or provide procedures that specify actions to be taken for a seismic event and failure of the leakage detection equipment (e.g., plant shutdown). The leakage detection method should be testable during operation.	3.1	Technical Specification change complete (Amendment 97).
			Evaluate sensitivity in conjunction with Topic III-5.A. (See Section 4.9.1.)	3.1	None
	4.16.2	Intersystem Leakage	None	---	
V-10.B	4.17	Residual Heat Removal System Reliability	Review and implement emergency procedures, including steps to proceed to a cold shutdown condition from outside the control room.	4.0	Procedural change complete
V-11.A	4.18	Requirements for Isolation of High- and Low-Pressure Systems	Install an independent pressure interlock for the reactor water cleanup (RWCU) system inboard suction isolation valve.	4.0	Region I outstanding Item No. 245/84-27-05. (ISAP Issue 1.04)

Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
V-12.A	4.19.1	Water Chemistry Limits	Revise Technical Specifications to incorporate RG 1.56 limits for chlorides and conductivity limits, or provide justification for not doing so.	3.2	Technical Specification change complete (Amendment 99).
	4.19.2	Limiting Conditiuns for Operation	None	---	
VI-4	4.20.1	Locked-Closed Valves	Install administratively controlled mechanical locking devices in the specified valves.	4.1	Complete including revisions to IPSAR requirements noted in Section 4.0.
	4.20.2	Lines Requiring a Second Valve and Both Locked Closed	Install a second valve and administratively controlled locking devices on both, on the specified lines.	4.2	Complete except for Region I outstanding Item No. 245/84-27-08.
	4.20.3	Remote Manual Valves	Demonstrate leakage detection, locate operating stations in accessible areas, and develop procedures for isolation of the specified valves.	2.12.1	None
	4.20.4	Valve Location	None	---	
	4.20.5	Instrument Lines	None	---	
	4.20.6	Valve Location and Type	None	---	
	4.20.7	Lack of Information	Review isolatiun capability of two lines and implement modifications, if necesary.	2.12.2	Relocate branch line connection points. (ISAP Issue 1.03)

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Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
VI-7.A.3	4.21.1	Testing of Space Coolers	Demonstrate that the space coolers are not essential. (Analysis submitted--under staff review.)	2.13	None
	4.21.2	Testing of the ESWS	None	---	
VI-7.A.4	4.22	Core Spray Nozzle Effectiveness	None	---	
VI-7.C.1	4.23.1	Automatic Bus Transfers	Evaluate the existing automatic bus transfers and identify corrective actions to ensure faulted loads would not be transferred.	2.14.1	Perform circuit breaker coordination analysis including need for instrument ac bus (ISAP Issues 1.21 and 2.17)
	4.23.2	Manual Bus Transfers	Install appropriate interlocks or provide justification for not doing so.	2.14.2	Same as above. (ISAP Issue 2.19)
VI-10.A	4.24.1	Surveillance Frequency	Evaluate the surveillance frequency of the specified channels.	4.0	None
	4.24.2	Channel Functional Test Frequency	None	---	
	4.24.3	Response-Time Testing	None	---	
VIII-1.A	4.25.1	Isolation Devices Between Reactor Protection System (RPS) and Monitoring Systems	Conduct test to determine if existing isolation is adequate. Propose corrective actions if necessary.	2.15	(ISAP Issue 1.22)
	4.25.2	Isolation Devices Between the RPS and its Power Supply	Provide adequate isolation.	4.0	None

Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
VII-3	4.26	Systems Required for Safe Shutdown	None	---	
VIII-1.A	4.27	Potential Equipment Failures Associated with Degraded Grid Voltage	Develop and implement procedures to protect Class 1E systems of a degraded grid voltage condition.	4.0	None
VIII-2	4.28.1	Startup Trips	Bypass light-off speed and generator excitation speed trips under accident conditions.	4.3	Region I outstanding Item No. 245/84-27-07. (ISAP Issue 1.01)
	4.28.2	Operational Trips	Bypass high lube oil temperature trip under accident conditions.	4.3	Region I outstanding Item No. 245/84-27-07. (ISAP Issue 1.01)
	4.28.3	Gas Turbine Preventive Maintenance Program	Implement a preventive maintenance program, improve existing one, or provide justification for not doing so.	2.16	None
	4.28.4	Generator Trips	Bypass specified trips under accident conditions.	4.3	Region I outstanding Item No. 245/84-27-08. (ISAP Issue 1.01)
	4.28.5	Annunciators	None	---	
VIII-3.A	4.29	Station Battery Test Requirements	Revise Technical Specifications to require battery service and discharge tests.	3.3	Technical Specification change complete (Amendment 99).
VIII-3.B	4.30.1	Battery Status Alarms and Indications	Install the specified battery status alarms or provide justification for not doing so.	2.17	Under staff review.

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Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
VIII-3.B	4.30.2	Battery Outage Limits	Revise Technical Specifications to reduce battery outage limits or provide justification for present limits.	3.4	Proposed Technical Specifications not received from licensee.
IX-3	4.31	Station Service and Cooling Water Systems	None (pending results of Topic II-4.F review).	---	
IX-5	4.32.1	Core Spray and LPCI Systems Ventilation	Demonstrate that the space coolers are not essential. (See Section 4.21.1.) (Analysis submitted--under staff review.)	2.18.1	See Section 2.15.
	4.32.2	Reinitiation of Ventilation After a Loss-of-Offsite-Power Event	Demonstrate that the equipment serviced is unaffected by the lack of ventilation and that the hydrogen combustion limit in the battery rooms will not be reached.	2.18.2	Modify operating procedures to start exhaust fans.
	4.32.3	Lack of Information	Provide information on the space coolers for the feedwater coolant injection and diesel generator areas.	2.18.3	(ISAP Issue 1.05)
	4.32.4	Intake Structure Ventilation System	Demonstrate that sufficient ventilation can be provided in a timely manner.	2.18.4	(ISAP Issue 1.05)
XV-1	4.33	Decrease in Feedwater Temperature, Increase in Flow, Increase in Steam Flow, and Inadvertent Opening of a Steam Generator Relief or Safety Valve	None currently; surveillance of turbine bypass valves and limits for reactor power if the turbine bypass is inoperable will be required if credit is taken for the turbine bypass in the reload analysis.	---	

Table 2.1 Summary of IPSAR and Supplement Evaluations

SEP Topic No.	IPSAR Section No.	Title	Requirements From IPSAR	Supplement Section No.	Requirements From Supplement
Xv-3	4.34	Loss of External Load Turbine Trip, Loss of Condenser Vacuum, Closure of Main Steam Isolation Valve (BWR), and Steam Pressure Regulator Failure (Closed)	None	---	
XV-16	4.35	Radiological Consequences of Failure of Small Lines Carrying Primary Coolant Outside Containment	Implement BWR Standard Technical Specification limit for primary coolant activity and propose, for staff review, associated action statements if these limits are exceeded.	3.5	Technical Specification change complete (Amendment 99).
XV-18	4.36	Radiological Consequences of a Main Steam Line Failure Outside Containment.	See Section 4.35.	3.6	See Section 3.5

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3 IPSAR TOPICS RESOLVED BY CHANGES TO PLANT TECHNICAL SPECIFICATIONS

During the Integrated Assessment for Millstone 1, a number of issues were resolved by commitments from the licensee to perform evaluations in order to determine whether modifications to plant Technical Specifications are warranted. In other cases, the licensee committed to adopt the corresponding requirements of the Standard Technical Specifications and the issue was considered resolved during the Integrated Assessment.

This section describes the actions taken regarding resolution of IPSAR issues involving Technical Specification changes. A summary of all changes to Technical Specifications and the associated license amendment is given in Table 3.1.

3.1 Topic V-5, Reactor Coolant Pressure Boundary Leakage Detection (NUREG-0824 Section 4.16)

10 CFR 50 (GDC 30) as implemented by Regulatory Guide 1.45 and SRP Section 5.2.5, prescribes the types and sensitivity of systems and their seismic, indication, and testability criteria necessary to detect leakage of primary reactor coolant to the containment or other interconnected systems.

In IPSAR Section 4.16, the staff concluded that:

(1) The licensee should provide a seismically qualified method for determining RCPB leakage or provide procedures that specify actions to be taken in the case of a seismic event and failure of the leakage detection equipment (e.g., plant shutdown).

(2) The method should be testable during operation.

(3) The licensee should evaluate leakage detection sensitivity requirements in conjunction with the resolution of Topic III-5.A for the purpose of establishing appropriate limiting conditions for operation.

By letter dated November 1, 1983, the licensee proposed changes to the plant Technical Specifications to address the matter. The staff approved the Technical Specifications by letter dated May 23, 1984, which transmitted Amendment 97 to the licensee. The Technical Specification change requires initiation of an orderly plant shutdown if leak rate cannot be determined as required by item (1) and (2) above. Since the pipe break issue was resolved without reliance on leakage detection provisions, there was no need to determine leakage detection sensitivity as described in (3) above. The staff's SER on pipe breaks, dated June 29, 1983, elaborates on this matter.

3.2 Topic V-12.A, Water Chemistry Limits (NUREG-0824 Section 4.19)

10 CFR 50 (GDC 14) as implemented by Regulatory Guide 1.56, requires that the reactor coolant pressure boundary have minimal probability of rapidly propagating failure. This includes corrosion induced failures from impurities in the reactor coolant system.

IPSAR Section 4.19.1 requires that the licensee revise their Technical Specifications for chlorides and conductivity to be consistent with Regulatory Guide 1.56 or provide justification for not doing so.

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The licensee proposed Technical Specification changes by letter dated December 28, 1983. The staff approved the Technical Specifications by letter dated June 21, 1984, which transmitted Amendment 99 to the license. The staff concluded that the Technical Specifications regarding reactor water conductivity and chloride concentration meet Regulatory Guide 1.56 limits, for the most part, and that the minor differences meet the intent of the guide. Therefore, the modified Technical Specifications will provide adequate protection for the primary coolant pressure boundary.

3.3 Topic VIII-3.A, Station Battery Test Requirements (NUREG-0824 Section 4.29)

10 CFR 50 (GDC 18), as implemented by Regulatory Guide 1.129, requires periodic testing to determine battery capacity and to demonstrate that the batteries will provide sufficient power under accident conditions.

The Millstone 1 battery surveillance requirements are included in Section 4.9.B of the station Technical Specifications. These specifications require a battery discharge test at each refueling outage or at least every 18 months. The current licensing requirement for a discharge test is once every 60 months; however, there is no battery service test in the station Technical Specifications. (Current requirements are for a battery service test every 18 months).

The staff proposed in IPSAR Section 4.29 that the testing of the batteries be in accordance with IEEE Std. 450-1975, IEEE Std. 308-1974, and the "Standard Technical Specifications for General Electric Boiling Water Reactors" (NUREG-0123). The associated tests are as follows:

(1) At least once every 18 months, during shutdown, a battery service test should be performed to verify that the battery capacity is adequate to supply and maintain in operable status all of the actual emergency loads for two hours.

(2) At least once every 60 months, during shutdown, a battery discharge test should be performed to verify that the battery capacity is at least 80% of the manufacturer's rating.

The licensee proposed these changes by letter dated December 13, 1983, and the staff approved the changes in Amendment 99 to the license, transmitted to the licensee by letter dated June 21, 1984.

3.4 Topic VIII-3.B, DC Power System Bus Voltage Monitoring and Annunciation (NUREG-0824 Section 4.30)

10 CFR 50.55a(h), through IEEE Std. 279-1971, and 10 CFR 50 (GDC 2, 4, 5, 17, 18, and 19), as implemented by SRP Section 8.3.2, Regulatory Guides 1.6, 1.32, 1.47, 1.75, 1.118, and 1.129, and BTP ICSB 21, require that the control room operator be given timely indication of the status of the station batteries.

In IPSAR Section 4.30.2, the staff noted that the PRA results from the Interim Reliability Evaluation Program (IREP) indicated that the current outage times allowed by Technical Specifications for the station batteries (7 days) are too long. The staff therefore, requested the licensee revise the TS or justify the existing limits.

The licensee is preparing a Technical Specification change to propose a 24 hour outage limit.

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3.5 Topic XV-16, Radiological Consequences of Failure of Small Lines Carrying Primary Coolant Outside Containment (NUREG-0824 Section 4.35)

10 CFR 100, as implemented by SRP Section 15.6.2, requires that the radiological consequences of failure of small lines carrying primary coolant outside containment be limited to small fractions of the exposure guidelines of 10 CFR 100.

During the topic review, the staff determined that Millstone Unit 1 did not comply with current licensing criteria. Based on the existing Technical Specification limits for primary coolant activity, the potential offsite doses would substantially exceed the applicable dose limits. Therefore, the staff position in the IPSAR was that reactor coolant activity limits should be maintained within the limits imposed on new operating reactors; that is, within the limits of the Standard Technical Specifications for General Electric Boiling Water Reactors (NUREG-0123). This is necessary to limit plant operation with potentially significant amounts of failed fuel so that the radiological consequences of events that do not damage fuel but do involve a release of reactor coolant to the environment will be low.

The licensee responded by letter dated December 28, 1983, which proposed to incorporate the primary activity limits given in the GE Standard Technical Specifications into the Millstone 1 Technical Specifications. Although the proposed action statement associated with these limits do not conform exactly with those in the Standard Technical Specifications, the staff concluded in a letter dated June 21, 1984, that they accomplish the intended objective and, therefore, approved the licensee's proposed Technical Specifications in Amendment 99 to the license.

3.6 Topic XV-18, Radiological Consequences of a Main Steam Line Failure Outside Containment

10 CFR 100, as implemented by SRP Section 15.6.4, requires that the radiological consequences of failure of a main steam line outside containment be limited to small fractions of the exposure guidelines of 10 CFR 100. On the basis of an independent assessment of the radiological consequences of a main steam line failure outside containment, the staff determined that Millstone Unit 1 did not meet the current acceptance criteria for this topic. If the existing Technical Specification limits for primary coolant activity were used, the potential offsite doses would substantially exceed the applicable dose limits.

The staff's evaluation showed that small-line failure is more limiting than the main steam line failure. Therefore, the conclusions presented in Section 3.5 apply to this section as well.

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TABLE 3.1
MODIFICATIONS TO MILLSTONE 1
TECHNICAL SPECIFICATIONS AS A RESULT OF SEP

Supplement Section	IPSAR Section	Title	Amendment No.
3.1	4.16	Reactor Coolant Pressure Boundary Leakage Detection	97
3.2	4.19	Water Chemistry Limits	99
3.3	4.29	Station Battery Test Requirements	99
3.4	4.30	Battery Outage Limits (Pending)	None
3.5	4.35	Radiological Consequences of Failure of Small Lines Carrying Primary Coolant Outside Containment	99
3.6	4.36	Radiological Consequences of a Main Steam Line Failure Outside Containment	99

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4 IPSAR TOPIC RESOLUTIONS CONFIRMED BY NRC REGION I OFFICE

During the Integrated Assessment for Millstone 1, a number of issues were resolved by commitments made by the licensee for specific plant modifications or procedural changes. Subsequent to issuance of the IPSAR for Millstone 1, Region I was requested through Task Interface Agreement 83-41, to verify that plant modifications had been implemented and to review changes to plant operating procedures made by the licensee. Table 4.1 provides a list of IPSAR action where confirmation by Region I was requested.

Region I conducted onsite inspections for each item identified in Table 4.1. The inspections consisted of examinations of installed equipment as well as a review of supporting procedures and other documentation. Region I concluded that the licensee had met the commitments documented in the IPSAR for the items in Table 4.1 except for the discrepancies discussed below. Each discrepancy was discussed with licensee management, who agreed to implement the necessary corrective action or to initiate additional correspondence if an alternative method of implementation was to be proposed. Inspection findings with the results of this review are documented in Inspection Report 50-245/84-27.

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TABLE 4.1

ITEMS FOR CONFIRMATION BY NRC

REGION I OFFICE

ITEM NO.	DESCRIPTION	IPSAR REFERENCE
1.	Revise flood emergency procedures as described in letter (Counsil (NNECO) to Crutchfield (NRC)) dated January 13, 1983. These revisions are to include: a) Keeping the large flood gate on the gas turbine building closed. b) Initiation of flood protection actions at a flood level of 8.0 msl.	4.1.6
2.	Revise inspection program to include inspection of floodwalls.	4.6.2
3.	Formalize inspection program for water control structures.	4.6.3
4.	Review and implement generic emergency procedures, including steps to proceed to a cold shutdown from outside the control room.	4.17
5.	Install an independent pressure interlock for RWCU system isolation.	4.18
6.	Install administratively controlled mechanical locking devices on specific valves.	4.20.1
7.	On specified lines, install a second isolation valve and administratively controlled locking devices on both valves.	4.20.2
8.	Revise operating procedures to include APRM and IRM channel checks every 8 hours.	4.24.1
9.	Provide isolation between the reactor protection system and its power supply.	4.25.2
10.	Procedures to protect Class 1E systems from a degraded grid voltage condition under non-accident conditions.	4.27
11.	Bypass light off speed and generator excitation speed trips under accident conditions.	4.28.1

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ITEM NO.	DESCRIPTION	IPSAR REFERENCE
12.	Bypass high lube oil temperature trip under accident conditions.	4.28.2
13.	Improve preventive maintenance program for gas turbine generator.	4.28.3
14.	Bypass specified generator trips under accident conditions.	4.28.4

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Discrepancies identified by Region I are as follows:

4.1 Install administratively controlled mechanical locking devices on manual containment isolation valves (NUREG-0824).

Four valves from the listing of nineteen in IPSAR Section 4.20.1 were found to be without mechanical locking devices. The licensee has taken action to lock those valves, none of which were mispositioned.

The licensee had revised system valve alignment procedures to include the requirements for locking closed the valves listed in this section of the IPSAR. However, three exceptions were found. These valves are associated with piping at containment penetrations X-210B and X-211A and had not been identified by station equipment number in the IPSAR. This may have contributed to the lack of locking devices for these valves, which were in the proper position.

The fourth valve, 1-CS-35B, was included on lists of valves to be locked, and was in the closed position but the inspector found the valve unlocked. A subsequent investigation by the licensee found that an incorrect valve had been locked. The locking of the wrong valve (which was properly positioned) presented no safety problem because both the locked and unlocked valves are core spray test line manual isolation valves in series with each other.

Based on these findings, plant equipment and system drawings were reviewed by the inspector for additional valves which would meet the criteria of IPSAR Sections 4.20.1 and 4.20.2.

The inspector identified six additional valves associated with the low pressure coolant injection (LPCI) and Core Spray systems. The licensee committed to install locks on these valves and to include them in the administrative procedures for locked valves.

They are:

Valve	Containment Penetration
Vents on Torus Test Line 3/4" CC-25;	
1-LP-77A	X-211A
1-LP-78A	X-211A
Drains on Containment Spray Line;	
1-LP-69B	X-39B
1-LP-70B	X-39B
Core Spray Line Local Leak Rate Test Connections;	
1-CS-38A	X-16A
1-CS-38B	X-16B

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Because of these findings, the licensee performed a full verification of all locked valves for both SEP commitments and for 10 CFR 50 Appendix J requirements and found no additional discrepancies.

This item will be followed up under Region I Outstanding Item No. 245/84-27-02.

4.2 Install a second isolation valve on lines with one manual containment isolation valve and lock closed both manual valves (NUREG-0824 Section 4.20.2).

In IPSAR Section 4.20.2 the staff identified three lines for modification. None have been modified to include a second valve; no valves were locked, and two of the valves, the torus drain and the LPCI/CS pump suction ring header drain valves, did not appear in valve alignment procedures. The third valve, 1-LP-67A, was not required to be locked closed. All these valves were in the proper position.

The licensee committed to lock closed all three valves and to revise the applicable procedures.

Each line was found with a pipe cap or blank flange in addition to the one manual valve. The torus drain line is equipped with a blank flange. Local leak rate testing is performed at that fitting by pressurizing between double "O" rings with the blank flange installed.

The licensee committed to review this finding and to update their previous commitments, contained in a December 27, 1982 letter to the NRC, if they intend to use pipe caps or blanked flanges instead of installing an additional valve. This item will be followed up under Region I Outstanding Item No. 245/84-27-03.

4.3 Integrated Safety Assessment Program (ISAP)

In relation to the ISAP, the licensee has identified associated plant modifications and has proposed deferring certain corrective actions beyond the original scheduled completion dates. Acceptance of this was addressed in an NRC letter to the licensee dated April 5, 1984.

Licensee programs to develop integrated implementation schedules, which would include these modifications, are presently outstanding with the NRC Office of Nuclear Reactor Regulation as part of ISAP.

These items are identified as follows:

Item	IPSAR Ref.	Outstanding Item No.	ISAP Issue
RWCU Interlock	4.18	245/84-27-05	1.04
EGTG Startup Trip	4.28.1	245/84-27-06	1.01
EGTG Operational Trip	4.28.2	245/84-27-07	1.01
Generator Trips	4.28.4	245/84-27-08	1.01

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5 REFERENCES

Code of Federal Regulations, Title 10, "Energy" (includes General Design Criteria)

Letter dated September 29, 1982 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic III-4.B, Turbine Missiles.

---, September 29, 1982 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic III-6, Seismic Design Considerations, III-11, Component Integrity.

---, December 3, 1982 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic VI-7.A.3, ECCS Actuation System; SEP Topic IX-5, Ventilation Systems.

---, December 27, 1982 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Integrated Assessment Supplemental Information.

---, February 23, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic VI-4, Containment Isolation System.

---, March 24, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic III-5.B, Pipe Break Outside Containment.

---, March 24, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic III-6, Seismic Design Considerations.

---, April 12, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic VI-7.C.1, Independence of Redundant Onsite Power Systems.

---, April 15, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic III-5.A, High Energy Pipe Break Inside Containment.

---, April 18, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic IX-5, Ventilation Systems.

---, May 10, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic VIII-2, Onsite Emergency Power System.

---, June 13, 1983, from Counsil (NNECO) to Dircks (NRC), Subject: Integrated Assessment of Regulatory Requirements.

---, June 20, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic VIII-2, Onsite Emergency Power System.

---, June 22, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic III-4.B, Turbine Missiles.

---, June 22, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic VI-4, Containment Isolation System.

---, July 20, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic III-2, Wind and Tornado Loadings.

---, September 14, 1983 from Council (NNECo) to Eisenhut (NRC), Subject: Integrated Safety Assessment Program.

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---, November 1, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: Proposed Technical Specification Change Leakage Detection.

---, December 2, 1983 from Counsil (NNECo) to Crutchfield (NRC), Subject: SEP Topic III-4.A, Tornado Missiles.

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---, RG 1.76, "Design Basis Tornado for Nuclear Power Plants."

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---, RG 1.115, "Protection Against Low-Trajectory Turbine Missiles."

---, RG 1.117, "Tornado Design Classification."

---, RG 1.118, "Periodic Testing of Electric Power and Protection Systems."

---, RG 1.129, "Maintenance, Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants."

---, RG 1.132, "Site Investigations for Foundations of Nuclear Power Plants."

---, RG 1.141, "Containment Isolation Provisions for Fluid Systems."

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APPENDIX A

REFERENCES TO STAFF SERS
FOR EACH TOPIC EVALUATED IN THE SUPPLEMENT

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IPSAR Supplement No.	Date	Reference
2.1	October 7, 1985	Letter from Zwolinski (NRC) to Opeka (NNECo) Subject: IPSAR Sections 4.1.1, Flooding Elevation, 4.1.7, Roofs; 4.5.1, Flood Elevation, 4.5.2, Groundwater; 4.6.1, Deficiencies Noted During Site Visit.
2.	November 25, 1985	Letter from Grimes (NRC) to Opeka (NNECo) Subject: IPSAR Sections 4.4 Wind and Tornado Loading and 4.7 Tornado Missiles.
2.7 2.8	June 29, 1983	Letter from Shea (NRC) to Counsil (NNECo) Subject: IPSAR Sections 4.9, Effects of Pipe Break On Structures, Systems and Components Inside Containment; 4.10.2, Jet Impingement Criteria - Outside Containment; and 4.16.1, RCPB Leakage Detection Operability Requirements.
2.11	September 16, 1985	Letter from Zwolinski (NRC) to Opeka (NNECo) Subject: ISAP Issue 1.20, MOV Interlocks.
2.12	July 7, 1983	Letter from Shea (NRC) to Counsil (NNECo), Subject: IPSAR Section 4.20, Containment Isolation.
2.13	July 5, 1983	Letter from Shea (NRC) to Counsil (NNECo), Subject: IPSAR Section 4.32, Ventilation Systems.
2.16	August 16, 1984	Letter from Shea (NRC) to Counsil (NNECo), Subject: IPSAR Section 4.28.3, Gas Turbine Preventive Maintenance Program.
2.18	July 5, 1983	Letter from Shea (NRC) to Counsil (NNECo), Subject: IPSAR Section 4.32, Ventilation Systems.
3.1	May 23, 1984	Letter from Crutchfield (NRC) to Counsil (NNECo), Subject: Redefinition of the Word "Operable" - Coolant Leakage Monitoring.
3.2	June 21, 1984	Letter from Crutchfield (NRC) to Counsil (NNECo), Subject: Technical Specification Changes to Reactor Coolant Chemistry Limits and Station Battery Testing Requirements.
3.3	June 21, 1984	See Reference for 3.2.
3.5	June 21, 1984	See Reference for 3.2.
3.6	June 21, 1984	See Reference for 3.2.

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APPENDIX B

NRC STAFF CONTRIBUTORS AND CONSULTANTS

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This Safety Evaluation Report Supplement is a product of the NRC staff and its consultants. The NRC staff members listed below were principal contributors to this report.

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16. ABSTRACT *(200 words or less)*

The Nuclear Regulatory Commission (NRC) has published its Supplement No. 1 to the Final Integrated Plant Safety Assessment Report (IPSAR) (NUREG-0824) under the scope of the Systematic Evaluation Program (SEP), for Northeast Nuclear Energy Company's Millstone 1 Plant located in Waterford, New London County, Connecticut. The SEP was initiated by the NRC to review the design of older operation nuclear power plants to reconfirm and document their safety. This report documents the review completed under the SEP for those issues that required refined engineering evaluations or the continuation of ongoing evaluations after the Final IPSAR for the Millstone 1 Plant was issued. The review has provided for (1) an assessment of the significance of differences between current technical positions on selected safety issues and those that existed when the Millstone 1 Plant was licensed, (2) a basis for deciding on how these differences should be resolved in an integrated plant review, and (3) a documented evaluation of plant safety when the supplement to the Final IPSAR and the Safety Evaluation Report for converting the license from a provisional to a full-term license have been issued. The Final IPSAR and its supplements will form part of the bases for considering the conversion of the license.

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